# ANES

Fredrik Schultz Johansson

| | COLLABORATORS | | |
|---|---|---|---|

| | *TITLE* :<br><br>ANES | | |
|---|---|---|---|
| *ACTION* | *NAME* | *DATE* | *SIGNATURE* |
| WRITTEN BY | Fredrik Schultz Johansson | May 28, 2025 | |

| | REVISION HISTORY | | |
|---|---|---|---|

| NUMBER | DATE | DESCRIPTION | NAME |
|---|---|---|---|
| | | | |

# Contents

# Chapter 1

# ANES

## 1.1  -÷×÷- A/NES -÷×÷-

```
                 _      _      _       ____
              /.\     /.\     /.\___  / __/
          _ _/ |_\_ _/ | \_ _/ |___/_/__ \_ _
          |Y  _/  Y   |   Y  _/  Y   |    Y|
          :|   |   |   |   |   |   |   |    |:
           :...:...:...:...:...:........:......:

             -$\div$-  Amiga Nintendo Emulator  -$\div$-
                      Version 0.99.6b
                          GIFTWARE


                    Development started:
                     8:th of May 1997


                      Created by:


                    Morgan Johansson
                    Fredrik  Schultz




                      Documentation

        The authors cannot be held responsible for any possible
        damage caused by this program. You are using it at your
                          own risk!
```

## 1.2  -÷×÷- A/NES -÷×÷-

```
   Welcome to A/NES - Amiga Nintendo 8-bit emulator.


      Introduction     A short introduction to A/NES...
      Requirements     What do you need to run this..?
      Installation     Shouldn't be a problem...
```

## 1.3    -÷×÷- A/NES -÷×÷-


TECHNICAL INFORMATION

The following utilities was used during the
development of A/NES.

            * ASM-ONE v1.29/v1.30
            * GADTOOLSBOX


A/NES consists of more than 13.000 lines of
pure assembly code. The source code (including gui)
is about 230 Kbyte in size.

The 6502 cpu emulation is NOT based on any existing
source and is written from scratch in assembly, making
special use of the 68020 processor or better.


## 1.4    -÷×÷- A/NES - GUI & Preferences -÷×÷-


GUI
Explaning about Load / Start ROM is not needed I guess. :)
The "continue" button will let you continue your game
when you have aborted it (by for example pressing the escape-key).
However this button is not entirely reliable yet so use
it with care.


PREFERENCES

Features enabled at this time are:

 GENERAL    EMULATION    CHEAT

--------------------------------------------------------

## 1.5   -÷×÷- A/NES -÷×÷-

GENERAL WINDOW

Graphics-driver / Scroll have no
function yet (they will in 1.0!)

LIMIT SPEED
This function disables all speed-limitation code. So,
if your favourite game always run at 50fps, it should
now run even faster (even if it will probably flicker
even more)....
On 68040/060 you can really enjoy FAAAST NES emulation.
About 2 - 3x NES speed is not unusual... :)
Default = checked

AUTOSAVE BATTERY
Turn this function off if you don't want to save the
battery.
Default = checked

IGNORE LED
Here is a real usefull option! :D
When this button is cleared, A/NES automatically
takes care of switching on/off the hardware sound-
filter to improve sound quality.
Check this if you don't want A/NES to do that.
Default = cleared

JOYPAD 1
Selects if you want to use keyboard/CD32 pad for
emulating joypad 1. Support for more pads will be
added later.

JOYPAD 2
Selects between "Disable" or "CD32". You should choose
"disable" if you don't want to use joypad2 (will
save a few cycles) or if you haven't got a CD32
compatible joypad. :)

## 1.6   -÷×÷- **A/NES** -÷×÷-

EMULATION WINDOW


HBLANK
Number of cycles / row. Only for advanced users.
Default value is 115.

EMULATE SOUND
Turn sound emulation on / off. Saves a few cycles
but shouldn't be noticable.

CHANNELS
There are three separate channels emulated yet by
A/NES. Here you can de-select any channel you don't
want to listen too.
The three channels are squarewave 1, square wave 2
and triangle wave.
Noise/PCM isn't implemented yet, but they are coming.


VOLUME
Sets the master volume of the sound.


## 1.7   -÷×÷- **A/NES** -÷×÷-

CHEAT WINDOW

 ACTION REPLAY INFORMATION

If you look on the left side of this window, you will
discover several "string gadgets", they look something
like this:


action replay
.------------. .------------.
|            | |            |
`------------' `------------'


.------------. .------------.
|            | |            |
`------------' `------------'


game genie
.------------. .------------.
|            | |            |

```
       `_____’ `_____’


       ._____. ._____.
       |           | |           |
       `_____’ `_____’
```

       In the Action Replay gadgets you can input Action Replay
       codes (really!) :)
       You can have four different codes activated at once.

       Game Genie codes works just like the ActionReplay codes.
       These codes will also be saved along with your saved patch
       files.

       Note that all values you type are default as HEX code, which
       means you don’t have to type $-signs or similar. Valid
       characters are 0-F, any other characters will be ignored.
       Also, be sure to "fill" the entire "string-fields", for example
       if you want to "poke" at adress 10, be sure to write 010!


       Cheat description – here you type a 64 character
       long description of your cheat. This is only usefull if you
       want to save your cheat into a special patch (.pat) file,
       so you don’t have to type your cheatcodes more than once.

       Activate – Be sure this button is activated if you
       want to use the current cheat codes.

       Save – Press this and your current cheat will be
       saved as a file.

       Load – Loads a cheatfile.


       Get filepath – Press this button to select a suitable
       path for storing your cheatfiles.
       There seems to be some kind of bug left in this code since
       the ROM path & cheat files path are mixed sometimes. Nothing
       serious though...


## 1.8   -÷×÷- A/NES - Registered Users -÷×÷-

       Information for registered users

       A/NES from now on is giftware, which means A/NES is not
       crippled anymore. But, still, keep your keyfile in a safe
       place. It’s not needed right now, but it may be usefull
       in the future.

## 1.9  -÷×÷- A/NES What's new? -÷×÷-

```
Features

- Full 6502 emulation (incl. ALL timings!)
- Battery backup
- Nice looking gui! :)
- Action Replay/Game Genie code support!
- Sound support
- OCS/ECS support! (AGA recommended!)
- Splitscreen scrolling
- Two player support
- Horizontal/ Vertical / Panning mirroring modes
  supported!
- CD32 joypad support
- XPK support
- Supports mappers 1,2,3,4,7,9,10,11,15,34 (more or less)
- Written in 100% 680x0 assembler code

Note! A/NES only supports loading of XPK packed ROM
files, not battery save files (*.sav).
```

## 1.10  -÷×÷- A/NES Controls -÷×÷-

```
JOYSTICK 1
----------

      When selecting "keyboard" in the preferences window,
      the following keys will work:

ENTER       - Start
RIGHT SHIFT - Select
LEFT AMIGA  - A
LEFT ALT    - B
      ARROWKEYS   - Guess what? :)

      ESCAPE      - Abort emulation


      ... or if you decide to use a CD32 compatible joypad:

      CD32
      ----

      YELLOW      - Start
      GREEN       - Select
      RED         - A
      BLUE        - B
      PAUSE       - Abort emulation


  JOYSTICK 2
```

----------
        Finally, joystick 2 is emulated! :)

        Choose between "disabled" or "CD32", that suites you
        the best.
        The keyboard is always locked to joystick 1 and may
        not be used by player 2.
        Always set this to "disable" when not using joystick 2.

        Support for more pads will be added in the future.

## 1.11    -÷×÷- A/NES Bugs -÷×÷-

Reporting bugs

Please report bugs to us that causes your computer
to behave strangly. (See our addresses elsewhere
in this guide file).
BUT! Don't report about non-working ROMS!
Many things is NOT emulated properly / yet, so please
have patience...

        When reporting bugs to us, don't forget to mention:
        * Your complete machine setup! (cpu, ram, PAL/NTSC?, etc)
        And anything else that may be usefull for us to know..

Known bugs/problems

        * Problems with some MMC's (caused by lack of good
          documentation).
        * Scrolling wrong / flickers.
        * Sound problems.
        * Sprites sometimes appear on strange places or
          flickers.

* CPU emulation bugs

## 1.12    -÷×÷- A/NES Requires -÷×÷-

Requirements

        - OCS/ECS/AGA chipset (AGA is recommended for best performance)
        - 68020+
        - ~2Mb of Memory
        - reqtools.library
        - lowlevel.library (if you want CD32 joypad support!)
        - xpkmaster.library (for loading XPK files!)

A/NES sometimes have problems to run on unexpanded
A1200 machines, so a fastram expansion is a good
thing to have.
However a 68030/050 should be enough to play most
games at a decent framerate.

NOTE! You can not view the NES title if your ROM
files are packed with XPK.

## 1.13  -÷×÷- A/NES is Giftware -÷×÷-

A/NES from now on is GIFTWARE. Which means no more
crippled versions for non-registered users!
Enjoy! :)

But if you like A/NES and uses it alot, sending
gifts to us are very welcome! :)

Prefered gifts are of course money. 100 SEK is
a good amount but equal amount in other currency
is of course also appreciated.


Send gifts to:

 FREDRIK SCHULTZ
 ÖSTRAVÄGEN 12
 715 31 ODENSBACKEN
 SWEDEN

 Send Metallica related stuff to this guy and you've
 got a friend for life! :)

Or

 MORGAN JOHANSSON
 MÖRBY
 715 92 STORA MELLÖSA
 SWEDEN

 This dude is a total NES-Maniac. Send everything
 related to NES to him. An IO-48/56 unit would be
 very appreciated. :) Also, NES games is also fine
 (check with him first though... :)


## 1.14  -÷×÷- A/NES Introduction-÷×÷-

Introduction

    It all started a day in may in the year of 1997. I was
    watching Nesticle on a PC machine and started to wonder
    why there wasn't any decent NES emulator for Amiga...
    So I (Morgan) and my friend Fredrik started this little
    project.
    We had never done anything like this before so it was
    a challenge.
    The CPU emulation (it's incredible fast) was written
    from scratch in 68020 assembly language and everything
    else concerning the emulation is also written in assembly.

    Enjoy it, and remember, if you like it and use it,
    send us gifts! :)


## 1.15    -÷×÷- A/NES -÷×÷-

The Legalities of Console Copying and Emulation
3-11-97, Copyright Anthony DiPasquale
http://www.pce.net/anthony, anthony@pce.net

   1.  Is it legal to create an emulator?
     There has been some discussion on this.  To create an emulator
   one must have a high level of knowledge of the source platform to
   be emulated, and the target platform the emulator runs on.  To find
   out info about the source, usually takes reverse engineering, of
   the original console, which may be considered illigal.

   2.  Is it illegal to run/use an emulator?
     This goes along with the above question.  There is debate around
   this as well.  The general rule to follow is:  You are allowed to
   own/run an emulator, as long as you actually own a corresponding
   hardware device.  Example, you own a game boy, so you are allowed
   to run a game boy emulator on your computer.

   3.  Is downloading ROM images illegal?
     No, it is not, as long as you own a hardware copy of each rom image
   you download.  If you download images you do not own a copy of, you
   are commimiting piracy.  By now, I'm sure Nintendo has realized that
   all the game boy game roms have been being illigally copied, that
   being one of the most popular emulators, and they do not seem to care.
   Chances are if you copy a Coleco, Atari, Sega Master System, etc, it
   wouldn't matter too much.  The general rule is:  If the company is no
   longer collecting royalties, they probably won't mind.  Who would pay
   $30 for a Coleco Vision ROM nowadays when you can go out and get the
   latest CD Rom game for about the same?  Most people don't pirate roms
   because they are too cheap, they do it because they may miss an old
   game that you could no longer purchase even if you wanted to.

   4.  Is storing/distributing ROM images illegal?
     It may not nessisarily be illegal, it is more up to the person who
   downloads the image then the person who provides it.  It is a
   questionable practice, and I wouldn't recommend it.  Even though you
   may see various web pages and FTP sites doing it, that doesn't make
   it legal.

## 1.16    -÷×÷- A/NES -÷×÷-

```
Action Replay

A/NES now supports "Action Replay" codes! A/NES at the moment
only support RAM based codes (most A.R codes are RAM based).
They should look something like this, and should always
consist of eight characters:

        0005B682   (this one gives you unlimited life in "Chip'n'Dale")

If you find codes that are less than 8 characters, maybe they
look like this:

        05B682

Just be sure to fill it with zeroes, so it gets 0005B682 =
eight characters.


Game Genie

Not supported yet, but soon.
```

## 1.17    -÷×÷- How 2 A/NES -÷×÷-

```
Installation

Use the installer script that is included in this
archive to install A/NES.

Thanks for the script, Lennart Johannesson!
```

## 1.18    -÷×÷- The future of A/NES -÷×÷-

```
The future (?)
This is very preliminary and will probably change.


* More speed!

* More compability.
```

```
        * Better sound.

        * Better & faster graphics!

        * Rewrite code for PowerPC?
```

## 1.19   -÷×÷- A/NES History-÷×÷-

```
 History
 --------------------------------------------------------
 Version:   Released:

      0.99.6b    1/4-98      * Game Genie support.
                             * "Continue"-button implemented.
                             * FAM-fileformat support.
                             * Added mapper 10.
                             * The usual bugfixes...

      0.99.5b    22/3-98     * A/NES is now giftware! All
                               features enabled for everyone!
                             * Sound emulation rewritten.
                             * PPU-related bugs fixed.
                             * Other minor fixes.

      0.99.1b    31/1-98     * Doesn't crash anymore if the
                               lowlevel.library isn't present.
                               (Thanks to Jesse Livengood for
                               reporting this ugly bug!)


      0.99b      25/1-98     * Now supports iNES extended file-
                               format (>16 mappers).
                             * Mapper #34 support.
                             * Mapper #7 bugfixed (works again!)
                             * Partial Mapper #15 support.
                             * Shouldn't crash anymore on exit.
                             * Minor CPU emulation speedup.
                             * Some spritecode optimised.
                             * Interrupthandler (NES) optimised.
                             * Keyboard settings changed.
                             * Spritebugs fixed once again.
                             * Screenmode related code removed
                               since it only caused trouble
                               (for everyone but me? :-)
                             * Filerequester code improved.
                             * Small optimisations here and there.
                             * Minor GUI bugfixes.


      0.98b      6/1-98      * Now supports 4 different
                               ActionReplay codes at once.
                             * Major MMC2 improvements.
```

```
                                       (Punch-Out looks alot better!)
                                    * MMC3 fixes (SMB3, StarTropics
                                      now partially works!)
                                    * Major spritebug fixed.
                                    * Small changes in GUI.
                                    * Minor fixes and optimisations.

0.97b       1/1-98                  * Happy New Year edition!
                                    * Small GUI changes.
                                    * Minor MMC3 changes.
                                    * Finally, two player support!
                                    * ADC instruction optimised!
                                    * Other minor changes.

0.96b      24/12-97                 * Christmas edition!
                                    * Filerequester code fixed.
                                    * Minor bugs in docs(!) fixed! :)
                                    * Small MMC2-fixes.
                                    * Cheatcodes can now be saved &
                                      loaded.

0.95b      14/12-97                 * Minor sound improvements.
                                    * Major GUI bug fixed!
                                    * Cheat preferences window now
                                      implemented.
                                    * Action Replay codes supported!

0.94b       7/12-97                 * Preferences is now available.
                                    * Nintendo MMC2 (Mapper 9) now
                                      finally works!
                                    * Sprite collision register fixed.
                                      Some games works / scrolls much
                                      better now.
                                    * Small changes in soundroutines.
                                    * Minor changes here and there.

0.93b      22/11-97                 * CPU emulation partly rewritten
                                      to improve performance on MMC-
                                      based games.
                                    * Now less memory hungry (~1Mb!)
                                    * Mapper 4 improved.

0.92b       8/11-97                 * Versionstring is now correct!
                                      (oops!) :)

0.91b       8/11-97                 * GUI font-bug fixed (silly!).
                                    * Bugfixed mapper 1.
                                    * Lots of other small fixes.

0.90b       1/11-97                 * Sprites rewritten (MUCH faster).
                                    * Splitscreen scrolling.
                                    * Sound code rewritten.
                                    * Now in theory works on ECS!
                                    * Bank switching code optimised.
                                    * Minor code cleanup.
                                    * GUI rewritten!
                                    * A/NES is STILL shareware, so
```

```
                                     register today!

     0.36b      28/9-97        * Major CPU bugfix!
                               * Small fixes (as usual!)

     0.35b      21/9-97        * Now supports XPK packed files!
                               * A/NES doesn't eat 1mb of fast
                                 memory anymore when started from
                                 an icon. ;)
                               * Small changes here and there.
                               * Small soundfixes.
                               * Internal version for registered
                                 users only!

     0.34b      13/9-97        * Small joypad bug fixed.
                               * Keyfiles are now supported.
                               * Minor speedup and fixes
                                 in the spriteroutines.
                               * Bank-switching code optimized.
                               * Triangle Wave soundchannel
                                 implemented.
                               * Minor optimisation in PPU
                                 code.

     0.33b       3/9-97        * A small (but major) CPU-bug
                                 fixed!
                               * CD32 joypad support!

     0.32b      31/8-97        * Sound support! (partial)
                               * A spriteregister wasn't
                                 properly emulated. Fixed now!

     0.31b      23/8-97        * FAST version included!
                               * Mapper #11 supported.
                               * Small fixes.
                               * A/NES is SHAREWARE! Support us!

     0.30b       5/8-97        * Mapper #4 is now partly supported!
                               * Mapper #7 supported.
                               * Mapper #9 now fully supported.
                               * Minor changes and bugfixes.

     0.29b       3/8-97        * Major improvements in the
                                 graphic routines, resulting
                                 in an incredible speedup in
                                 some games.
                               * Minor fixes.

     0.28b      27/7-97        * A register wasn't properly
                                 emulated. Fixed now! (some
                                 games works alot better!)
                               * Battery backup functions
                                 added!
                               * Mapper #1 emulation improved
                                 and bugfixed (ALOT)!
                               * The filerequester now remembers
                                 where you "left it" the last
```

```
                                                  time (saved in S:ANES.prefs).
                                                * Small CPU emulation bugs fixed.

            0.27b       19/7-97              * Mappper #1 emulation improved
                                                  but not yet perfect.
                                                * 8x16 sprites supported.
                                                * Some emulation bugs fixed.
                                                * GUI changes/fixes.
                                                * File requester routines bug-
                                                  fixed once again.
                                                * And some other changes...

            0.26b       13/7-97              * Keyboard handler a little bit
                                                  improved.
                                                * File requester should now
                                                  work properly (phew!)
                                                * ESCAPE is now used to abort
                                                  the emulation.

            0.25b       12/7-97              * Damn! Bugfixing the previous
                                                  version resulted in another
                                                  bug. The "cannot click any
                                                  button" bug should now have
                                                  been removed

            0.24b       12/7-97              * Major improvements in the
                                                  keyboard handler!
                                                * Mapper #1 partly supported!
                                                * Minor GUI fixes.
                                                * Small CPU bugs fixed.

            0.23b        8/7-97              * Minor fixes.
                                                * Some GUI-NTSC problems fixed.

            0.22b        8/7-97              * Shouldn't crash anymore if
                                                  started from an icon.

            0.21b        6/7-97              * Fixed some minor stupid bugs!
                                                * 50 FPS speed limit for fast
                                                  computers. (Could cause very
                                                  annoying flickering if framerate
                                                  was more than 50FPS).
                                                * We're still at SCC'97 and we have
                                                  just found out that we won the
                                                  democompo! :)

            0.20b        6/7-97              * Released at the SCC '97 party
                                                  held in Köping, Sweden.
                                                * Mapper 2 and Mapper 3 supported.
                                                * Many bugfixes.
                                                * Sprite routines optimised.
                                                * Colours now look better.

    0.10a      30/6-97   * First official beta release!


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```

## 1.20    -÷×÷- A/NES -÷×÷-

Authors of A/NES:


MORGAN JOHANSSON
MÖRBY
715 92 ST.MELLÖSA
SWEDEN

computer : A1200T, Blizzard 68060/50,
           16mb Fast, 6.4Gb HD, 20x IDE CD.
e-mail   : morgan.johansson@mbox301.swipnet.se

guilty of: 6502 CPU emulation
           Sound
           Mapper support
           ROM-handler
           Gfx in general
           Bugtesting (and finding most of them)

------------------------------------------------------

FREDRIK SCHULTZ
ÖSTRAVÄGEN 12
715 31 ODENSBACKEN
SWEDEN

computer : A1200, Blizzard 68020/28,
           4mb Fast, 4.3Gb HD.
e-mail   : fredrik.schultz@swipnet.se

guilty of: 6502 CPU emulation
           GUI
           Gfx in general
           Sprite & Scrolling
           Some bugfixing

------------------------------------------------------

Also big thanks to
  Dew / Limited Edition - for fixing the keyboard handler!


## 1.21    -÷×÷- Frequently Asked Questions -÷×÷-

Frequently Asked Questions

Q: Why is not Mapper5 supported?

A: Mapper 5 (or MMC5) is an incredible device that almost
   turns your NES into a new machine. It's VERY complex
   and the question is if it's ever going to be emulated
   properly.

Q: Why is there graphics errors in Punch Out using
        mapper 9?

A: Mapper 9 (or MMC2) is a quite advanced MMC and every
   function is not yet emulated (not discovered how it
   works). Mapper 9 has some impressive functions to
   bankswitch VROM and this affects A/NES performance
   in a negative way. We're sorry for this (blame
   Nintendo! :)

Q: My action replay codes doesn't work. Why?

A: Could be due to several reasons:
   1) Check your spelling. Is it 8 characters long?
   2) The code may be ROM based, and this does not
      work yet in A/NES
   3) The action replay code may be for a different
      version of the game and may not work with yours.
   4) Is the "activate" switch on? :)
   5) Bugs in our code? :) :)

Q: A/NES crashes when I try to run some games.

A: In rare cases this may happen. We are looking into
   this problem.


Q: A/NES just quits when I try to start it. Why?

A: Check that you have installed the included font in
   your FONTS: directory properly.
   Do you have enough memory available?


Q: Why do I get an 'XPK ERROR' message?

A: You are trying to load an XPK packed file, that is
   either corrupt or simply, you don't have the
   xpkmaster.library and it sub-libraries installed in
   your LIBS: drawer.


Q: Why is A/NES written in assembler and not C?

A: There is enough slow c-ports out there, don't you think?

Q: I keep getting a "FAILED" message what does that mean?

A: Well, the game has tried to execute an invalid assembler
   instruction. This is probably not caused by the game itself,
   it is just caused by bugs in our emulator. :)


Q: It doesn't work correctly on my NTSC system.

A: Hopefully most of these problems are gone now.


Q: In some games, the graphics looks very strange.

A: Yes. This could be the result of an unsupported (or not
   an entirely supported) Mapper chip.


Q: Why doesn't A/NES multitask?

A: A/NES doesn't use any system routines becuase of
   speed-reasons. Running A/NES in a workbench window would
   sure be nice, if you have an INCREDIBLE fast machine, but
   most Amiga users doesn't have that kind of equipment today.


## 1.22   -÷×÷- A/NES Greetings to: -÷×÷-

Thanks to:


Thanks to:

Bloodlust Software, D, Dew/LED, FanWen, Firebug, Fredrik Olsson,
Lennart Johannesson, Leo Flavum, Marat Fayzullin, Nate_DAC,
Nintendo, Paul Robson, Ville Helin, Y0shi, #amycoders

+ everyone that has supported us this far in our project.
Especially thanks to those which have registered / sent us
gifts! Thanks guys! We won't forget you!